

# PATENT SPECIFICATION

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## (54) IMPROVEMENTS RELATING TO BAGS

(71) We, METAL Box LIMITED of Queen House, Forbury Road, Reading RG1 3JH (formerly THE METAL Box COMPANY LIMITED of 37 Baker Street, London W1A 1AN), a British company, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed to be particularly described in and 10 by the following statement:—

This invention relates to bags comprising a length of tubular flexible plastics packaging material adapted to be closed at a first end thereof and having a pair of opposed 15 front and rear walls joined by opposed longitudinally-extending side gussets (such a bag will be called herein a "bag of the kind hereinbefore specified"); to packs comprising a bag of the kind hereinbefore 20 specified and goods contained therein, said first end of the bag being closed (such a pack will be called herein a "pack of the kind hereinbefore specified"); and to methods of making such bags and packs. 25 According to the invention in a first aspect, in a bag of the kind hereinbefore specified an end portion of said length of tubular material at a second end thereof is folded over about a transverse fold line defining 30 an extremity of the bag, to form a substantial transverse hem extending over the whole width of the bag with a welded transverse seam extending across at least part of the hem and spaced longitudinally 35 from the fold line, said seam joining together the folded front and rear walls and side gussets whereby at each side of the bag a portion of seam comprises at least eight thicknesses of aid material, 40 said second end of the bag defining a top end of a handle defined by a perforation through the hem intermediate the fold and the seam.

In a typical embodiment, the perforation 45 is spaced longitudinally from said fold line

and extends generally transversely over part of the width of the hem. In a preferred form, the perforation is a transverse slit which terminates at each end thereof in a downwardly-extending re-entrant portion, 50 for example substantially in the shape of a "C".

The carrying means may take other forms and the perforation may extend from the hem down to a position below the level 55 of the transverse weld seam. The hem may be discontinuous, having a gap in a central portion thereof which may for example accommodate a separate handle of known kind, e.g. a moulded plastics handle 60 supported from the hem behind the fold line.

It will be understood that the tube from which the bag is formed may be a single-ply, gusseted lay-flat plastics tube, preferably seamless, though it could be fabricated for example from two sheets of material laid together, welded together at the sides and formed with side gussets. The material may, however, be of two or more plies, for example a laminated 70 material of any suitable kind including plastics material.

The gussets are preferably single gussets (i.e. when laid flat the gusset itself consists of two thicknesses of material), though 75 bags having multiple gussets giving an even number of thicknesses when laid flat, are theoretically possible. In the preferred case of a single gusset, there are eight thicknesses of the bag material in the weld seam 80 across the width of each side gusset. This gives particularly high strength to the weld seam, from which the weight of the bag, when loaded with goods, is supported.

The said first end (normally the bottom end) of the bag may be of any convenient form for the intended application of the bag, and forms no part of the present invention beyond the fact that in the finished bag and in the pack this end is closed. 85 90

According to the invention in a second aspect, there is provided a method of making a bag of the kind hereinbefore specified from a length of tubular flexible packaging material which has a first end and a second end and a pair of opposed front and rear walls joined by opposed longitudinally-extending side gussets, said method including the steps of folding over 5 an end portion at said second end of said length of material about a transverse fold line so that the fold line shall define an extremity of the bag, to form a substantial transverse hem; forming a transverse seam across at least part of the hem at a position spaced longitudinally from the fold line, by welding together the folded front and rear walls and side gussets along the line of said seam; and forming carrying 10 means in the hem by making a perforation through the hem. The invention in its first aspect includes a bag made by such a 15 method.

The folding of the end portion to form 20 the hem may be performed manually, but is preferably performed in a machine. Thus in a preferred embodiment of the method, the folding-over step is performed by holding said end flat between two gripping devices spaced apart longitudinally of said 25 length of material; and bringing said gripping devices substantially together that the material of said end portion extending between them is collapsed in folded form between one of said devices and the other.

According to the invention in a third aspect, in a pack of the kind hereinbefore specified the bag is a bag according to the said first aspect of the invention. The invention is especially advantageous in 30 providing such packs for automatic or semi-automatic packing of goods. This may take place in a factory or warehouse, for example; but it may also be used in establishments of the supermarket or cash-and-carry type, in conjunction with equipment of the kind in which the cashier loads goods into an open bag or into open bag 35 material, and the bag is then closed or the bag material formed into a complete bag, by operation of the equipment. One example of such equipment is briefly described in British patent specification No. 1 275 175.

According to the invention in a fourth aspect, there is provided a method of making a pack of the kind hereinbefore specified from a tubular length of flexible packaging material having a first end and a 40 second end and a pair of opposed front and rear walls joined by opposed longitudinally-extending side gussets, said method including the steps of loading said length of tube with goods through said 45 second end, forming said length of material

into a bag by a method according to said second aspect of the invention.

Preferably said first end is closed by forming a transverse weld seam thereacross.

The said third aspect of the invention includes a pack made by the method defining the fourth aspect thereof. The goods may be loaded in before or after the first or bottom end is finally closed, though the tube must be held closed below the goods 70 while the latter are being loaded and until the first end itself is properly closed off.

An embodiment of the invention will now be particularly described, by way of example only and with reference to the accompanying drawings, of which:—

Figure 1 is a side elevation of a portable bag in one preferred form according to the invention, shown empty for convenience;

Figure 2 is a section on the line II-II in 80 Figure 1, showing the bag slightly open for clarity;

Figure 3 is a section on the line III-III of Figure 1, but on a larger scale;

Figure 4 is a perspective view showing 90 upper parts of the same bag;

Figure 5 is an end view of a pack comprising a loaded bag according to the invention;

Figure 6 is a diagrammatic elevation 95 illustrating features of a known device, for use at supermarket check-outs in making packs of customers' goods by forming a bag around the goods;

Figure 7 is a diagrammatic elevation 100 showing bag-closing means including a pair of gripping devices adapted for closing the upper end of a bag according to the present invention, the gripping devices being shown in an open position ready to start a 105 closing operation;

Figure 8 shows part of a bag or bag material in an open condition as associated with Figure 7;

Figure 9 shows the same bag or bag 110 material being closed;

Figure 10 shows the gripping devices of Figure 7 having closed the top end of a bag;

Figures 11 and 12 show two subsequent 115 stages in the closing of a bag in accordance with the invention; and

Figure 13 illustrates the effect of the weight of the contents of a bag on a handle thereof.

The only difference between the bag shown in Figures 1 to 3 and that in Figures 4 and 5 is that the latter is shown loaded with goods. With reference therefore to Figures 1 to 5, the portable bag 125 shown therein is formed of a tube of flexible plastics material, comprising two opposed sidewalls 10 joined by two side gussets 11, each of which extends along a respective side of the tube. The tube is 130

closed at the bottom by a transverse lower weld seam 12.

The tube has at its upper end an end portion 13 which is folded or turned about a fold line 14 defining the top edge of the bag, to form a deep hem 15, which is secured in its folded condition by a transverse upper weld seam 16. The spacing of the weld seam 16 from the fold line 14, i.e. 5 the depth of the hem, is of the order of two inches, though mention of this figure is not limiting and is intended mainly to make it clear that the welded seam is spaced some way from the top edge of the bag. The seam 16 may be continuous as 10 shown in Figures 1 and 4, or intermittent as shown in Figure 13.

As can be seen from Figure 3, which is 15 a section through the upper weld seam 16, 20 but which shows the various layers of material slightly separated for clarity, the effect of providing the turned hem 15 is that there are eight layers of material overlying each other over that portion (indicated at 17 in Figures 1 and 3) of the transverse width of the bag which includes the gusset 11. Over the remaining portion 25 18 of the transverse width, lying between the portions 17, there are four thicknesses. Thus the upper weld seam 16 consists of 30 two portions, one of which is that enclosed by the chain dotted lines in Figure 3, each consisting of eight layers of material welded together; the two weld seam portions 35 17 being joined by a centre portion of the weld over the length 18, Figure 1, in which four layers are welded together. This centre portion of the weld may however be omitted if desired, leaving the bag unsealed.

40 Carrying means, in the form of an integral handle 20 having four thicknesses of material, are provided in the turned hem 15 between the upper weld seam 16 and the top end fold line 14. The handle 20 is 45 defined by a slit 21, formed through all four thicknesses and extending transversely across part of the bag width. The slit 21 terminates at each end in a portion 22 which extends downwards from the straight 50 part of the slit 21 and is of re-entrant form, in that the end 23 of each portion 22 extends away from the sides of the bag. In the present example the re-entrant portions 22 are "C"-shaped.

55 As can be seen from Figure 13, when the loaded bag is lifted by the carrying handle 20, the weight of the load imposes, at each end of the handle, a downward and outward tensile force, the general 60 direction of which is indicated by the arrows 24. Provision of the re-entrant portions 22, avoids having an end of the slit 21 directed in the same general direction as the tensile force 24; the possibility of 65 the bag material being torn under the

stress imposed in the region of the handle is thereby reduced.

The end portions 22 of the handle slit may if desired be joined together so that the slit 21 becomes a hole, by removal of 70 the residual flaps 25 which result from the formation of the slit 21.

In the present example the upper weld seam 16 is positioned a little way in from the inner edge 26 of the turned hem, so 75 that there is a residual flap 27. The upper weld seam 16 may be so placed as to minimise the size of this flap and may coincide with or overlap the inner edge 26; alternatively a second weld seam may be 80 provided, for example as indicated at 28 in Figure 1, to seal the flap down to the adjacent side-wall 10.

A method for making a pack, consisting 85 of a portable bag generally similar to that shown in Figures 1 to 5 and containing goods, will shortly be described hereinafter. In this method the bag is in fact made mainly after the tube of which it is to be made has been loaded with goods; and this 90 or similar methods according to the invention would be suitable especially for use in shops, warehouses, factories or other establishments having suitable equipment, for example equipment following principles 95 as illustrated in Figure 6.

Figure 6 shows in very simplified diagrammatic form part of a machine 1 for use at a supermarket check-out point. In this machine, gussetted lay-flat plastic tubing is drawn up from a reel (not shown) 100 between rollers 41 which hold the two side walls 10 of the tubing together. However, above the rollers 41 the walls 10 of the tubing are separated, the upper end being held open by suitable grippers 5 while goods are loaded into the open tube from the top. When loading is completed, upper and lower pairs of heat-sealing jaws 6 and 7 respectively come together to seal the tube above and below the goods which lie between the sidewalls 10, so forming the bag around the goods. Reference is made to the aforementioned British specification 110 1 275 175 for further details of this system 115 which are not relevant to an understanding of the present invention.

A method of making a pack, and in particular a bag, will now be described in more detailed terms; the apparatus used 120 may be that just described with reference to Figure 6.

In this said method, side-gussetted lay-flat flexible plastics tube material 40 having a cross-section as already described 125 and as shown in Figure 2, has a top end portion 13 thereof held open, as shown in Figures 7 and 8, by bag-closing means comprising two pairs of gripping jaws shown diagrammatically at 42, 43, 44 and 130

45. The upper pair of jaws 42, 43 are capable of movement horizontally together and apart, and vertically towards and away from the lower pair of jaws 44, 45. These lower jaws are capable of movement horizontally together. The means for moving the jaws is not part of the present invention and is not shown, but may be for example any suitable conventional type of 10 jaw-actuating means.

One of the upper jaws 42 has a slitting blade 46 for forming a slit such as the slit 21, Figure 1, the blade 46 being directed downwards towards the corresponding 15 lower jaw 44. At least one, and preferably each, of the jaws 42 and 44 is provided with a heatable welding bar 47 for forming the upper weld seam 16, Figure 1, on the bag. A compressed-air nozzle 48 is 20 mounted for movement with the other lower jaw 45, at the side of the apparatus opposite that at which the blade 46 and welding bar or bars 47 are situated.

In operation, the tube 40 is held closed 25 at a lower level, for example by rollers 41 as in Figure 6 or by jaws, or by previously forming the welded bottom seam 12, Figure 1. The tube may at this stage be part of a length of tubing extending from a reel, as 30 described already with reference to Figure 6, or it may already have been cut to the required length of a bag, as convenient.

Goods are loaded through the open mouth of the end portion 13 of the tube, 35 Figure 7, and the upper jaws 42, 43 are brought together. Simultaneously the lower jaws 44, 45 are brought together. This action, at an intermediate stage, is illustrated in Figure 9, in which the tube material is 40 shown partly closed. It is completely closed by the time the jaws of each pair come together as shown in Figure 10.

The upper jaws 42, 43 are now moved downwards from the first position shown in 45 Figure 10, and at the same time a jet of compressed air is directed at the material of the end portion 13 of the tube by the nozzle 48, so causing the hitherto straight end portion 13 to be folded about a fold 50 line 49 into a collapsed condition between the jaws 42 and 44. The blade 46 forms the slit 21 and the jaw 42 approaches and reaches the end of its travel, in the second position shown in Figure 12, where the two 55 pairs of jaws are substantially together. It will be seen that the fold line 49 is the fold line 14 of the turned hem 15, Figures 1 to 5, the end portion 13 now being the turned hem 15 and the flap 27, Figure 4, 60 being trapped between the upper jaws 42, 43.

The welding bars 47 are now energized and become heated so as to form the upper weld seam 16, after which the upper 65 jaws 42, 43 can be moved upwards, for

which purpose they may have gripping surfaces 50 of any suitable kind (for example saw-tooth serrations) such as to grip the bag material firmly when descending but to slip easily past it when ascending.

The jaws are all then returned to the position shown in Figure 7. The bottom end of the bag is then closed by formation of the bottom weld seam 12 (though this may be done before the bag is loaded), 75 and the completed pack can be removed.

It will be understood that, where a method such as that just described is used in apparatus of the kind shown in Figure 6, the jaws 42 to 45 would take the place 80 of the grippers 5 and upper sealing jaws 6.

It will be understood that a bag according to the invention may be loaded with goods through the bottom end, i.e. it may be supplied with the folded top end portion 15, upper weld seam 16 and, if provided, carrying means as described in the foregoing, the bottom end seam 12 being formed after the goods have been 85 loaded into the bag.

#### WHAT WE CLAIM IS:—

1. A bag of the kind hereinbefore specified, wherein an end portion of said length of tubular material at a second end thereof is folded over about a transverse fold line defining an extremity of the bag, to form a substantial transverse hem extending over the whole width of the bag with a welded transverse seam extending across at least part of the hem and spaced longitudinally from the fold line, said seam joining together the folded front and rear walls and side gussets whereby at each side of the bag a portion of said seam comprises at least eight thicknesses of said material, said second end of the bag defining a top end of a handle defined by a perforation through the hem intermediate the fold and the seam.

2. A bag according to Claim 1 wherein 110 the bag is formed in one piece.

3. A bag according to Claim 1 or Claim 2, wherein the perforation is spaced longitudinally from said fold line and extends generally transversely over part of 115 the width of the hem.

4. A bag according to Claim 3, wherein the perforation lies intermediate between the side gussets.

5. A bag according to Claim 4, wherein 120 said perforation is a transverse slit terminates at each end thereof in a downwardly-extending re-entrant portion of the slit.

6. A bag according to any one of the preceding claims, wherein the said seam 125 extends over the whole width of the bag, to comprise said portions each comprising at least eight thicknesses of material joined by a central portion of the seam com- 130

rising at least four thicknesses of said material.

7. A method of making a bag of the kind hereinbefore specified from a length 15 of tubular flexible packaging material which has a first end and a second end and a pair of opposed front and rear walls joined by opposed longitudinally-extending side gussets, said method including the 10 steps of folding over an end portion at said second end of said length of material about a transverse fold line so that the fold line shall define an extremity of the bag, to form a substantial transverse hem; forming

5 a transverse seam across at least part of the hem at a position spaced longitudinally from the fold line, by welding together the folded front and rear walls and side gussets along the line of said seam; and forming carrying means in the hem by making a perforation through the hem.

8. A method according to Claim 7 wherein the folding-over step is performed by holding said end flat between two grip-

25 ping devices spaced apart longitudinally of said length of material; and bringing said gripping devices substantially together so that the material of said end portion extending between them is collapsed in folded form between one of said devices and the other.

9. A method according to Claim 8, for which each of said gripping devices comprises a pair of jaws arranged to grip the 30 tubular packing material in flattened form between said jaws.

10. A method according to Claim 9, for which at least one of said gripping devices is associated with heating means disposed 40 for forming a transverse weld seam across at least part of the folded portion of said material, the step of forming a transverse seam being performed by energising said heating means when the gripping devices 45 are brought substantially together.

11. A method according to any one of Claims 8 to 10, wherein said performance is made by piercing means movable with the gripping devices so as to form the perforation as the gripping devices are brought substantially together.

12. A bag according to Claim 1, made by a method according to any one of Claims 7 to 11.

55 13. A pack of the kind hereinbefore specified, whereof the bag is a bag according to any one of Claims 1 to 6 or Claim 12.

14. A method of making a pack of the kind hereinbefore specified from a tubular 60 length of flexible packaging material having a first end and a second end and a pair of opposed front and rear walls joined by opposed longitudinally-extending side gussets, said method including the steps of 65 loading said length of tube with goods through said second end, forming said length of material into a bag by a method according to any one of Claims 7 to 11, and forming a closed said first end of the 70 bag by closing said first end of the length of material.

15. A method according to Claim 14, wherein said first end is closed by forming 75 a transverse weld seam thereacross.

16. A method according to Claim 14 or Claim 15, wherein the steps of folding over the end portion at said second end and forming the transverse seam across at least part of the resulting hem are performed 80 after the goods are loaded into the length of material.

17. A pack according to Claim 13, made by a method according to any one of Claims 14 to 16.

85 18. A bag of the kind hereinbefore specified, having its bottom end open but being in other respects substantially as hereinbefore described with reference to Figures 1 to 3 of the accompanying drawings.

19. A bag according to Claim 18, modified as hereinbefore described with reference to Figure 13 of the accompanying drawings.

95 20. A pack of the kind hereinbefore specified, substantially as hereinbefore described with reference to Figures 4 and 5 of the accompanying drawings.

21. A pack according to Claim 20, 100 modified as hereinbefore described with reference to Figure 13 of the accompanying drawings.

105 22. A method of forming a pack according to Claim 20 or Claim 21, substantially as hereinbefore described with reference to Figures 7 to 12 of the accompanying drawings.

23. A pack formed by a method according to Claim 22.

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FIG. 1

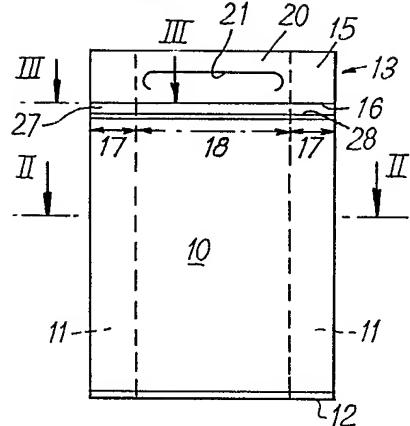


FIG. 5

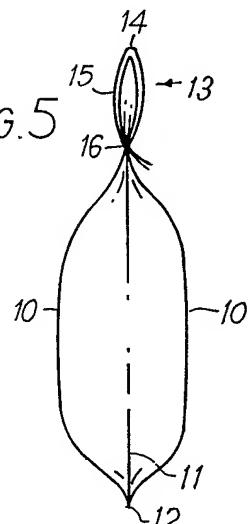


FIG. 2

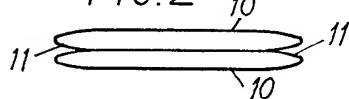


FIG. 3

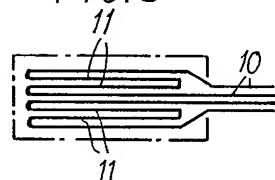


FIG 4

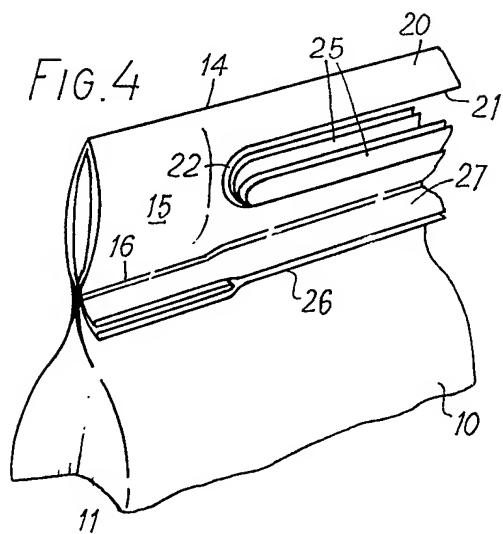


FIG. 6

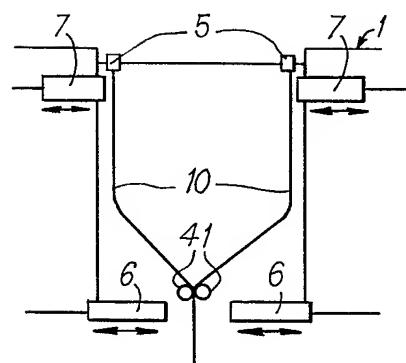


FIG. 7

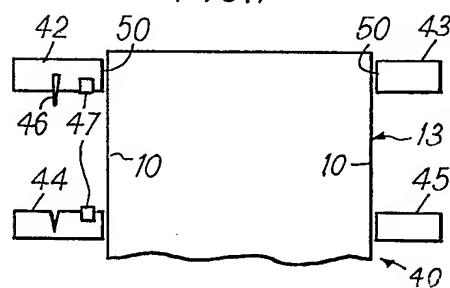


FIG. 8

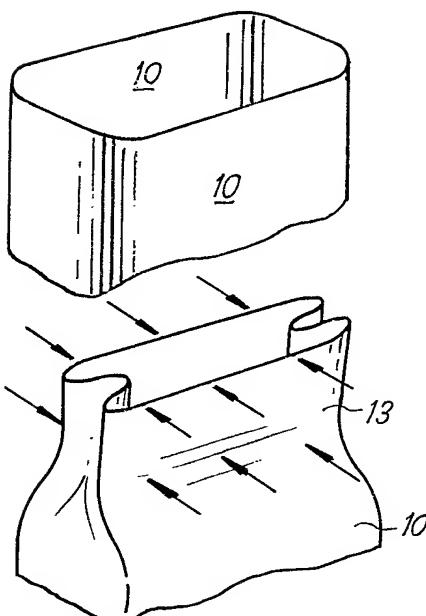


FIG. 9

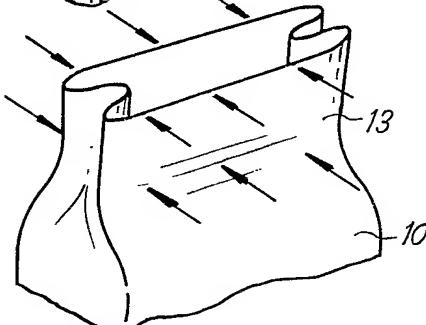


FIG. 13

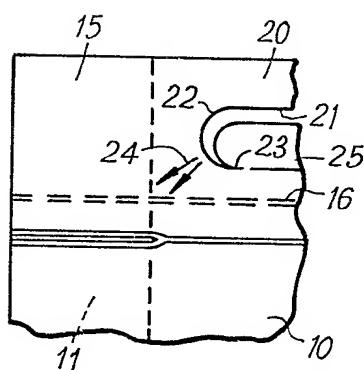


FIG. 10

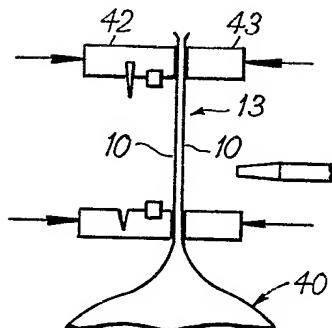


FIG. 11

